CLAIMS

1. A medical implant (1) comprising oscillator monitoring means (10) for monitoring the function of oscillator means (2) in the medical implant (1), said oscillator means (2) producing periodic pulses for use in the operation of the medical implant (1), said oscillator monitoring means (10) detecting a deviation in said function and providing a deviation signal (D) indicating said deviation detection; and

measuring means (20) for obtaining at least one physiological parameter (P) emanating from the human body, said parameter comprising a time component, and for generating an electric signal (E) related to said time component, said oscillator monitoring means (10) being connected to the measuring means (20) for using said electric signal (E) for said deviation detection.

2. The medical implant (1) according to claim 1, wherein the monitoring means (10) comprises signal processing means (11) for processing the electric signal (E) and for generating an oscillator status signal (S), and comparing means (15) for comparing said oscillator status signal (S) with a reference signal (Ref).

3. The medical implant (1) according to claim 2, wherein said measuring means (20) comprises sensor means (21) for sensing the physiological parameter (P).

4. The medical implant (1) according to claim 3, wherein the sensor means (21) comprises cardiac electrodes (22) for receiving cardiac signals (C) emanating from cardiac electrical activity, said cardiac signals (C) constituting the physiological parameter (P) and being representative of the time component and forming an IEGM.

5. The medical implant (1) according to claim 4, wherein said measuring means (20) comprises detector

means (25) connected to the sensor means (21) for detecting the QRS complex and the T-wave of the IEGM, and for generating said electric signal (E), said electric signal (E) comprising a QRS detection signal (Q), and a T-wave detection signal (T).

6. The medical implant (1) according to claim 5, wherein said signal processing means (11) comprises counting means (12), said counting means (12) being connected to said detector means (25) for receiving the QRS and the T-wave detection signals ($Q$, $Q^I$, $T$, $T^I$), and to said oscillator means (2) for receiving the periodic pulses,

said counting means (12) being arranged for counting the number of periodic pulses received between the reception of the QRS detection signal ($Q$, $Q^I$) and the T-wave detection signal ($T$, $T^I$), and for outputting said number as said oscillator status signal (S).

7. The medical implant (1) according to claim 4, wherein

said measuring means (20) comprises detector means (25) connected to the sensor means (21) for detecting the QRS complex of the IEGM, and for generating said electric signal (E), said electric signal (E) comprising a QRS signal indicating the beginning and the end of the QRS complex; and

said signal processing means (11) comprises counting means (12) connected to said detector means (25) for receiving the QRS signal, and to said oscillator means (2) for receiving the periodic pulses, said counting means (12) being arranged for counting the number of periodic pulses received between the beginning and the end of the QRS complex, and for outputting said number as said oscillator status signal (S).

8. The medical implant (1) according to claim 4, wherein

said measuring means (20) comprises detector means (25) connected to the sensor means (21) for detecting the QRS complex and the amplitude of theQRS, and for generating said electric signal (E); and

said signal processing means (11) comprises integrating means connected to said detector means (25) for receiving the electric signal (E), said integrating means being arranged for integrating said amplitude during the QRS complex, and for outputting said integration as said oscillator status signal (S).

9. The medical implant (1) according to claim 3, wherein

the sensor means (21) comprises at least one microphone for converting sensed periodic heart sounds into an electric periodic sound signal, said heart sounds constituting the physiological parameter (P);

the measuring means (20) comprises detector means (25) connected to the sensor means (21) for detecting chosen characteristics of the sound signal, and for generating said electric signal (E) indicating said characteristics; and

the signal processing means (11) is arranged for outputting said oscillator status signal (S) based on said electric signal (E).

10. The medical implant (1) according to any one of claims 2-9, wherein the reference signal (Ref) comprises predefined threshold values, and wherein the monitoring means (10) provides the deviation signal (D) indicating whether the comparing means (15) determines the oscillator status signal (S) to be outside of the threshold values, or not.

11. The medical implant (1) according to any one of the preceding claims, comprising deviation handling means for handling a deviation in said oscillator means, said deviation handling means being connected to said

monitoring means (10) for reception of said deviation signal (D).

12. The medical implant (1) according to claim 11, wherein said deviation handling means comprises

a back-up system including back-up oscillator means for producing periodic pulses, said periodic pulses in a normal state not being used in the operation of the medical implant (1), and

switching circuitry connected to said main and back-up oscillator means for switching between the normal state and a deviation state by disconnecting said oscillator means (2) and for simultaneously connecting said back-up oscillator means such that the periodic pulses produced in said back-up oscillator means are used in the operation of the medical implant.

13. The medical implant (1) according to claim 12, wherein said monitoring means (10) further is arranged for detecting a deviation in the function of said back-up oscillator means and for providing a deviation signal (D) indicating the detection of such a deviation, and wherein said deviation handling means is arranged for handling a deviation in said back-up oscillator means.

14. The medical implant (1) according to claim 12 or 13, wherein said back-up oscillator means is an RC oscillator.

15. The medical implant (1) according to any one of claims 11-14, wherein said deviation handling means comprises alarm means for producing an alarm signal when the received deviation signal (D) indicates a deviation.

16. The medical implant (1) according to any one of the preceding claims, wherein said oscillator means (2) is a crystal oscillator.

17. A method of monitoring the function of oscillator means (2) in a medical implant (1), preferably a heart stimulator, the method comprising

obtaining at least one physiological parameter (P) emanating from the human body, said physiological parameter (P) containing a time component; and

using said physiological parameter (P) in monitoring the function of said oscillator means.

18. The method according to claim 17, wherein the step of monitoring said function comprises

detecting a deviation in said function; and

providing a deviation signal (D) indicating said deviation detection.

19. The method according to claim 17 or 18, wherein the step of obtaining said physiological parameter (P) comprises

sensing said physiological parameter (P); and

generating an electric signal (E) based on said physiological parameter (P); and

wherein the step of detecting said deviation comprises

processing the electric signal (E) and thereby generating an oscillator status signal (S); and

comparing said oscillator status signal (S) with a reference signal (Ref).

20. The method according to any one of claims 17-19, wherein said physiological parameter (P) is a cardiac signal (C) emanating from cardiac electrical activity, said cardiac signals (C) being representative of the time component and forming an IEGM.

21. The method according to claim 20, wherein the step of processing the electric signal (E) comprises

detecting the QRS complex of the IEGM;

detecting the T-wave of the IEGM;

receiving periodic pulses from said oscillator means;

counting the number of received periodic pulses between said detection of the QRS complex and said detection of the T-wave; and

outputting said number as the oscillator status signal (S).

22. The method according to any one of claims 19-21, wherein said reference signal (Ref) comprises predefined threshold values; and

wherein the step of comparing said oscillator status signal (S) with a reference signal (Ref) comprises

providing a deviation signal (D) indicating whether the comparing means (15) determines the oscillator status signal (S) to be outside of the threshold values, or not.

23. The method according to any one of claims 18-22, further comprising the steps of

receiving the deviation signal (D) provided by the comparing means (15);

handling a deviation in said oscillator means (2) when the received deviation signal (D) indicates a deviation.

24. The method according to claim 23, wherein the step of handling a deviation comprises

activating a back-up system comprising back-up oscillator means for generating periodic signals, said periodic signals in an normal state not being used for the operation of the implant; and

switching between the normal state and a deviation state by disconnecting said oscillator means (2) and for simultaneously connecting said back-up oscillator means such that the periodic pulses produced in said back-up oscillator means are used in the operation of the medical implant.

25. The method according to claim 24, further comprising the steps of

detecting a deviation in the function of said back-up oscillator means and for providing a deviation signal (D) indicating detection of such a deviation; and

handling a deviation in said back-up oscillator means.

26. The method according to any one of claims 24-25, wherein the step of handling a deviation comprises activating an alarm signal.